

**REMARKS**

The Examiner is respectfully requested to reconsider the rejections of claims 1, 2, 8 and 9 under 35 U.S.C. §102(b) and of claims 3 to 5, 8 and 9 under 35 U.S.C. §103(a) on grounds of lacking patentability over Fontein, et al.

It is respectfully submitted that the claims presented in the application, subject to the correction of claim 4 hereof, clearly patentably define over the teaching disclosed by Fontein, et al. The claimed invention relates to a micro-bubble generating system, in which a swirling micro-bubble cavity under negative pressure is formed deep in the system, while the swirling cavity is cut off and atomized by introducing the swirling liquid injection flow in the vicinity of the outlet. In the vicinity of the outlet, swirling and diffusing flow is generated from inside toward outside due to the pressure difference between the inner portion and the outer portion. As a result, the micro-bubble cavity is cut off and atomized in stable manner. Each of the micro-bubbles thus generated is in size of 10-20  $\mu\text{m}$ . This is essentially different from conventional type air bubble generating systems including that disclosed by Fontein, et al..

The generation of such micro-bubbles and the mechanism for generating such micro-bubbles cannot be found in the conventional type system known in the past, such as the system by Fontein, et al. This is the major difference between the present system and the system of the reference.

In particular, in the system of the present invention, the positional relationship between liquid inlet and liquid outlet and the length of the micro-bubble cavity are clearly defined. Unless such relationship is clearly defined, it is not possible to normally generate the micro-bubbles (i.e. in such size and quantity as embodied in the disclosed invention). It is the special feature of the present system that such positional relationship is clearly defined, as contrasted with comparable prior art equipment.

For example, in the concerned system of Fontein, et al., the tip of the system is narrowed down whereby depressurization of the fluid is obstructed. The system of the present invention, on the other hand, is not constricted so that in the claimed system, pressure is instantly discharged from a high-pressure region (the inner region) to a low-pressure region (the outer region). This constitutes a significant difference from the features of the prior art systems such as that of Fontein, et al.

Moreover, the system of the present invention has a simple structural configuration wherein a large quantity of micro-bubbles could be generated in an energy-saving manner.

In view of the above, Applicant respectfully requests that the Examiner enter this Amendment in the case and pass the application to issue. In the event the Examiner is constrained to retain the rejection of claims in the application it is requested that the Examiner nonetheless enter the amendments to claim 4 and to Figure 1(b) herein in order to place the application in better condition for appeal.

U.S. Patent Application Serial No. 09/743,531

On the other hand, however, if the Examiner finds that minor revision is still required to render the claims in the application satisfactory, it is requested that he call the Applicant's attorney at the telephone number indicated below in order to expedite the changes required to place the application in condition for allowance.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned "**Version with markings to show changes made.**"

In the event that this paper is not timely filed, Applicant respectfully petitions for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper, to Deposit Account No. 01-2340.

Respectfully submitted,

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PATENT TRADEMARK OFFICE

Enclosures:   Version with markings to show changes made  
                  Request for Approval of Drawing Corrections w/Fig s 1(b) marked in red ink

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**VERSION WITH MARKINGS TO SHOW CHANGES MADE 09/743,531**

**IN THE CLAIMS:**

Claim 4 was **AMENDED** as follows:

4. (Twice Amended) A micro-bubble generating system according to one of claims 1 or 2, wherein [the] a pressurized liquid introducing hole is opened on a part of the circumferential surface of inner wall near [the] a gas-mixture outlet from said interior space.